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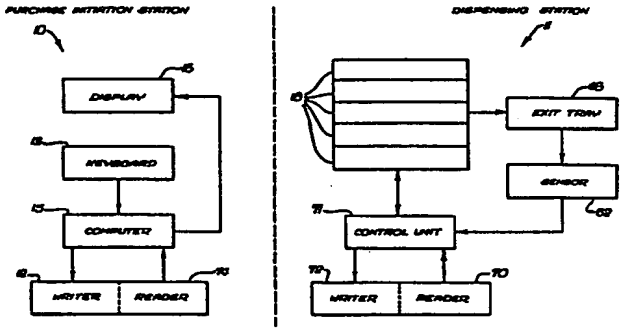
(54) Article dispensing apparatus and a method of dispensing articles.

(57) A dispensing apparatus includes a purchase initiation station (10) and a plurality of remotely located dispensing stations (11). A message carrier is encoded at the initiation station and then presented to a dispensing station where it is read. The information on the carrier corresponds to an article found in a particular receptacle (18), which is thus actuated to dispense that article. The message carrier is then re-encoded to indicate that the article has been dispensed. At the initiation station, the carrier can be read to determine whether a correct article has been dispensed.



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Article dispensing apparatus and a method of dispensing articles

THE PRESENT INVENTION relates to article dispensing apparatus, and more particularly to such apparatus that employ a dispensing apparatus remotely located with respect to a purchase initiation station. A method of dispensing articles is also disclosed.

The retailing of many articles that have a relatively high selling price and are sold in large volumes has become very problematic because of the problems of pilferage and inventory shrinkage. Examples of such articles are pre-recorded audio and video tape cassettes. If such articles are displayed on open shelves, losses from pilfering and damage may be so high as to make sales entirely unfeasable from a business point of view. On the other hand if the articles are kept in locked cabinets, they require an inordinate amount of time for dispensing and the problem of theft by employees is not solved.

One approach to this problem has been the use of vending machines. However, vending machines generally require that a purchaser use coins and usually have only a limited facility for providing change. They are regarded as inconvenient and unsuitable for higher priced items. Moreover, many vending machines are so constructed that they do not prevent pilferage.

An object of the present invention is to overcome the above problems of prior art dispensing apparatus. A further object is to provide a system that is relatively secure against theft by the general public and by employees. Another object is to provide a system that is readily compatible with computerized inventory control and accounting systems.

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Accordingly, in one aspect the invention provides an article dispensing apparatus comprising: a purchase initiation station including a first writer means for encoding a message carrier with indicia corresponding to a particular category of article to be dispensed, and a first reader means for decoding a returned message carrier and thereby determining whether that message carrier has been used to cause an article to be dispensed; at least one article dispensing station including a plurality of receptacles in which various ones of said category of articles can be stored, releasing means associated with each of said receptacles for selectively dispensing said articles therefrom upon actuation thereof; second reader means for decoding said message carrier and actuating one of said releasing means associated with one of said receptacles corresponding to said encoded indicia, and second writer means for re-encoding said message carrier to indicate that said article has been dispensed.

Desirably, said purchase initiation station is remote from said dispensing station.

Preferably, said first and second writer means are adapted for recording information magnetically; and said first and second reader means are adapted for reading magnetically recorded information.

In a preferred embodiment said dispensing station includes sensor means for detecting one of said articles after it has been dispensed by one of said releasing means and for actuating said second writer means in response thereto to re-encode said message carrier.

In a further aspect the invention provides a method of dispensing articles comprising: encoding a message carrier at a purchase initiation station with indicia corresponding to a particular category of article to be dispensed; presenting said message carrier at an article dispensing station remote from said purchase initiation station; decoding said indicia and dispensing an article corresponding thereto; re-encoding said message carrier with indicia to indicate that said article has been dispensed; returning said message carrier to said purchase initiation station; and decoding said re-encoded to determine that said article has been dispensed.

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In order that the invention may be more readily understood, and so that further features thereof may be appreciated, an embodiment of the invention will now be described by way of example and with reference to the accompanying drawings, in which:

FIGURE 1 is a perspective view of a part of a dispensing apparatus constructed in accordance with the present invention;

FIGURE 2 is a partially broken away left side elevation of the dispensing apparatus of Figure 1, showing the article, receptacles and delivery mechanism;

FIGURE 3 is a fragmentary front elevation taken inside the dispensing station to show two receptacles and the conveyor mechanism;

FIGURE 4 is a fragmentary cross-sectional view taken from the left inside the dispensing system and showing a receptacle and the conveyor mechanism;

FIGURE 5 is an enlarged view of the portion of Figure 4 indicated by the arrow 5 with the delivery mechanism in an actuated position;

FIGURE 6 is an enlarged fragmentary cross-sectional view taken crosswise through the delivery mechanism in the closed position and showing that mechanism in phantom lines in its open position;

FIGURE 7 is an enlarged fragmentary front view of the delivery mechanism;

FIGURE 8 is an enlarged fragmentary top view of the delivery mechanism in its closed position, the open position being illustrated in phantom lines; and

FIGURE 9 is a schematic representation of the purchase initiation station and the delivery stations of the invention.

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Referring to the drawings, and particularly to Figure 9, an article purchase and dispensing apparatus constructed in accordance with the present invention includes a purchase initiation station 10 and a plurality of article dispensing stations 11 that are remotely located from the initiation staton but are preferably but not necessarily located within the same retail establishment. The initiation station 10 includes a writer 12 for encoding a suitable carrier, for example a strip of magnetic tape on a plastic card i.e. a card similar to a common credit card, that serves as a message carrier. The writer 12 may be conventional equipment of the type commonly used to encode credit cards and cards used to operate such devices as magnetically actuated locks.

A sales clerk uses a keyboard 13 to encode the carrier with indicia to identify a particular article 14 to be dispensed. For example, if the articles to be dispensed are pre-recorded tape cassettes, then a cassette containing musical selections by a particular artist may be specifically identified. The identifying information may also be supplied to a computer 15 where the sale can be recorded for accounting and inventory purposes. However, the use of this information for other purposes, while convenient and compatible with the invention, does not form part of the invention itself. All that is required is that the message carrier be encoded with indicia corresponding to an article 14 to be dispensed. The format in which the information is recorded can be selected arbitrarily and preferably is unique to a particular system so that a message carrier encoded for one retail establishment cannot be used at another.

As a separate, non-automated function the sales clerk may collect payment for the article 14.

An electronic display 16 can be included at the initiation station 10 to display the same information with which the carrier is encoded, thus enabling a customer to verify immediately that the clerk has understood the transaction and entered it properly.

Once the carrier had been encoded, the customer takes this to a dispensing station 11 that contains the article 14 to be dispensed. An exemplary dispensing station 11 is shown in Figures 1 and 2. The station 11

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includes a cabinet 17 that houses a plurality of horizontal rows of receptacles 18 extending transversely within the cabinet. Each receptacle 18 may be dedicated to a particular type of article 14, with each article in that receptacle being alike. Thus the indicia on the message carrier that corresponds to a particular category of article 14 also corresponds to a particular receptacle 18 in which that article is stored.

A releasing mechanism 20, including an open frame 21 and a trap door-like support member 22 formed at the bottom thereof is provided at the front of each receptacle 18. The releasing mechanism 20 is shown in detail in Figures 2, 3, 4 and 5 and a similar suitable mechanism is described in greater detail in US-A-4,215,800.

A solenoid 23, that forms a part of the releasing mechanism 20, is mounted beneath each receptacle 18, as best shown in Figure 4. When actuated, the solenoid 23 causes the support member 22 to pivot into an open position while a bail 24 simultaneously presses downwardly on the top of an article 14 pushing the article through the bottom of the releasing mechanism 20 causing a leaf spring 25 to be compressed whilst the article slides across two parallel guide fingers 26. After a single article has been dispensed the trap door mechanism is closed to prevent more than one article from being dispensed. The remaining articles 14 are then moved towards the front of the receptacle 18 by a spring driven carriage 27. In this way, successive articles 14 can be released from the receptacle 18 sequentially.

An elongate trough-like chamber 28 extends across the cabinet 17, just behind a front panel 19 and forward of the releasing mechanisms 20. As best shown in Figures 3 and 4 the chamber 28 is positioned just below the bottom row of receptacles 18. The chamber 28 is adapted to receive articles 14 as they are dispensed by the releasing mechanisms 20. A bottom portion 30 of the chamber 28 is defined by two vertical walls 32 spaced apart just enough to receive one of the articles 14 in the same orientation in which it would be held in the receptacle 18. At a top portion 34, the walls 32 of the chamber 28 fan out toward the front and back of the cabinet 17 to act as guides for the articles 14 entering into the narrower bottom portion 30 of the chamber 28.

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A conveyor mechanism 36, formed by endless belts 38 driven by pulleys 40 and a motor (not shown), extends horizontally beneath the bottom of the chamber 28 and effectively forms a floor for the chamber in the region of the conveyors. As best seen in Figure 7 the conveyor mechanism 36 is formed in two sections 36(a) and 36(b) that operate to carry articles 14 towards a delivery mechanism 42 that is positioned centrally with respect to the cabinet 17 and between the two conveyor belts 38 of respective conveyor sections 36(a) and 36(b).

As shown in Figure 2, the delivery mechanism 42 includes a carrier 44 that has a U-shaped cross section and, with the delivery mechanism in a closed position, as illustrated in Figure 2, is aligned with a center part of the bottom 30 portion of the chamber 28 where a rectangular lower portion of the chamber structure is cut away. Forward of the carrier 44 and just below it an exit tray 46 is provided. The exit tray 46 is supported on the front panel 15. Extending upwardly from the tray 46 and integrally formed therewith is a tube 47, the top end of which defines an escape opening 48. The tube 47 is arranged to receive articles 14 and to allow these to pass to the exit tray 46 wherein it is readily accessible from outside of the cabinet 17 and may be withdrawn.

When an article 14 within the carrier 44 is to be delivered, the carrier is moved forward to an open position (shown in phantom lines in Figures 6 and 8) in which the open bottom of the carrier is aligned with an escape opening 48, thus allowing the article to fall into the tray 46. The carrier 44 then returns to its closed position in a reciprocatory manner, its movement being perpendicular to the direction of travel of the conveyor belts 38 and the elongation of the chamber 28.

Extending forward from the front edge of the carrier 44 is a guard plate 52. With the delivery mechanism 42 in its closed position, the guard plate 52 covers the escape opening 48. When the carrier 44 moves forward, the guard plate 52 slides forward beyond the tube 47 opening the tube for dispensing of the article.

A motor 56 is provided to cause movement of the carrier 44 and the guard plate 52. The motor 56 is mounted on a shelf 57 beneath the

receptacle 18 directly behind the carrier 44 and is connected to the carrier by a rigid link 58. The force of the motor 56 is preferably insufficient to cause injury to a hand inserted in the mechanism. A single complete revolution of the motor 56 causes the carrier 44 to move from its closed position to its open position and back to its closed position. The operative cycle is arranged to ensure that the carrier 44 dwells over the opening 48 for the tray 46 as the link 58 reaches the farthest extent of its travel and the end of the link attached to the motor moves arcuately but primarily cross-wise with respect to the transverse movement of the carrier.

An operating cycle of the apparatus described above will now be explained. First, a selected releasing mechanism 20 is actuated, causing a selected article to be ejected forwardly and downwardly into the narrow space between the receptacles 18 and the front panel 15. As described above, selection of a particular release mechanism is dictated by the information encoded on a carrier. Simultaneously, the conveyor belts 38 are actuated. The released article falls into the chamber 28 and is guided into the lower chamber portion 30 where it comes to rest on one of the belts38. The belt 38 then carries the article 18 transversely towards the center of the dispensing station where it is loaded into the carrier 44. If the article 14 should initially enter the portion of the chamber 28 directly above the carrier 4, it will, of course, fall directly into the carrier without first coming to rest on either of the belts 38.

Once the released article 14 has entered the carrier 44, its presence will be detected by either or both of two optical article sensors 60, thus actuating the motor 56. The carrier 44 then moves forward and allows the article 14 to fall through the escape opening 48 into the exit tray 46. When the carrier 44 again returns to its closed position, this is sensed by an optical position sensor 62, the signal from the sensor deactivating the motor 56 and providing a positive indication that the article 14 has been dispensed. It should be noted that a signal will not be produced by the position sensor 62 unless two events take place: (1) the article 14 must enter the carrier 44, and (2) the carrier must reciprocate. If an article 14 is not dispensed, due to an empty receptacle 18 or a malfunction, no signal will be produced by the position sensor 62.

The anti-theft characteristics of the machine should be readily appreciated. With the delivery mechanism 42 in its normal closed position there is no access to the interior of the dispensing station through the exit tray 46. By reaching into the exit tray 46, one can at most reach the top of the tube 47 where the escape opening 48 is blocked by the guard plate 52.

For the dispensing station 11 to commence a normal operating cycle, an appropriate releasing mechanism 22 must be actuated. This is accomplished by inserting the message carrier into a conventional card reader 70 for example of the type used to read magnetically encoded credit cards and the like. Upon reading the card, the releasing mechanism 20 of the receptacle 18 that corresponds to the recorded indicia is actuated, through a control unit 71, which may be a microprocessor, by energizing the solenoid 23 and the desired article 14 is dispensed.

After the article 14 has been released from the receptacle 18, it is detected by the article sensor 60 and the position sensor 62. A signal thus generated by one of these sensors 60, 62 activates a writer 72 at the dispensing station 11. Preferably, the signal is taken from the position sensor 62 because this signal indicates the occurrence of the last event that must take place before the article 14 is physically made available to the purchaser. The writer 72 at the dispensing station 11 cannot be activated until the article 14 has actually been released, as the writer is not activated by the energization of the solenoid 23 and the operation of the releasing mechanism 20.

When the writer 72 is activated, it re-encodes the message carrier. The writer 72 at the dispensing station 11 is of the same construction as the writer 12 at the purchase initiation station 10. It simply rewrites the information identifying the article dispensed and the corresponding receptacle 18, but in a different format. Alternatively, the original information recorded on the message carrier can be retained and the re-encoding step may consist of adding or removing indicia. It is preferable, however, to make a complete new recording because it is thereby rendered more difficult to make an unauthorized alteration of the message carrier to permit it to be reused. Moreover, a completely new recording is readily

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accomplished by conventional magnetic tape recording devices that need not be specially constructed for this purpose.

The used and re-encoded message carrier can now be returned to the purchase initiation station 10 where it can be read by a reader 74. Thus, the message carrier may be used to serve as a receipt. Moreover, if the dispensing station 11 should fail to deliver the desired article 14, due to a malfunction or because the designated receptacle 20 is empty, the message carrier will not be altered and it can be determined at the purchase initiation station that the customer is entitled to a refund.

It will be appreciated that the present invention provides a highly secure and reliable system for dispensing articles. The system is particularly well suited to video and audio tape cassettes that present serious pilferage problems. Moreover, the system is readily compatible with computerized inventory control and accounting systems since it can provide input to those systems indicating the purchase made and the merchandise dispensed.

The features disclosed in the foregoing description, in the following claims and/or in the accompanying drawings may, both separately and in any combination thereof, be material for realising the invention in diverse forms thereof.

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CLAIMS

1. An article dispensing apparatus comprising: a purchase initiation station including a first writer means for encoding a message carrier with indicia corresponding to a particular category of article to be dispensed, and a first reader means for decoding a returned message carrier and thereby determining whether that message carrier has been used to cause an article to be dispensed; at least one article dispensing station including a plurality of receptacles in which various ones of said category of articles can be stored, releasing means associated with each of said receptacles for selectively dispensing said articles therefrom upon actuation thereof; second reader means for decoding said message carrier and actuating one of said releasing means associated with one of said receptacles corresponding to said encoded indicia, and second writer means for re-encoding said message carrier to indicate that said article has been dispensed.

2 Apparatus according to claim 1, wherein said purchase initiation station is remote from said dispensing station.

3. Apparatus according to claim 1, wherein said first and second writer means are adapted for recording information magnetically; and said first and second reader means are adapted for reading magnetically recorded information.

4. Apparatus according to claim 1 or claim 2, wherein said dispensing station includes sensor means for detecting one of said articles after it has been dispensed by one of said releasing means and for actuating said second writer means in response thereto to re-encode said message carrier.

5. A method of dispensing articles comprising: encoding a message carrier at a purchase initiation station with indicia corresponding to a particular category of article to be dispensed; presenting said message carrier at an article dispensing station remote from said purchase initiation station; decoding said indicia and dispensing an article corresponding thereto; re-encoding said message carrier with indicia to indicate that said article has been dispensed; returning said message carrier to said purchase initiation station; and decoding said re-encoded to determine that said article has been dispensed.

Fig. 1

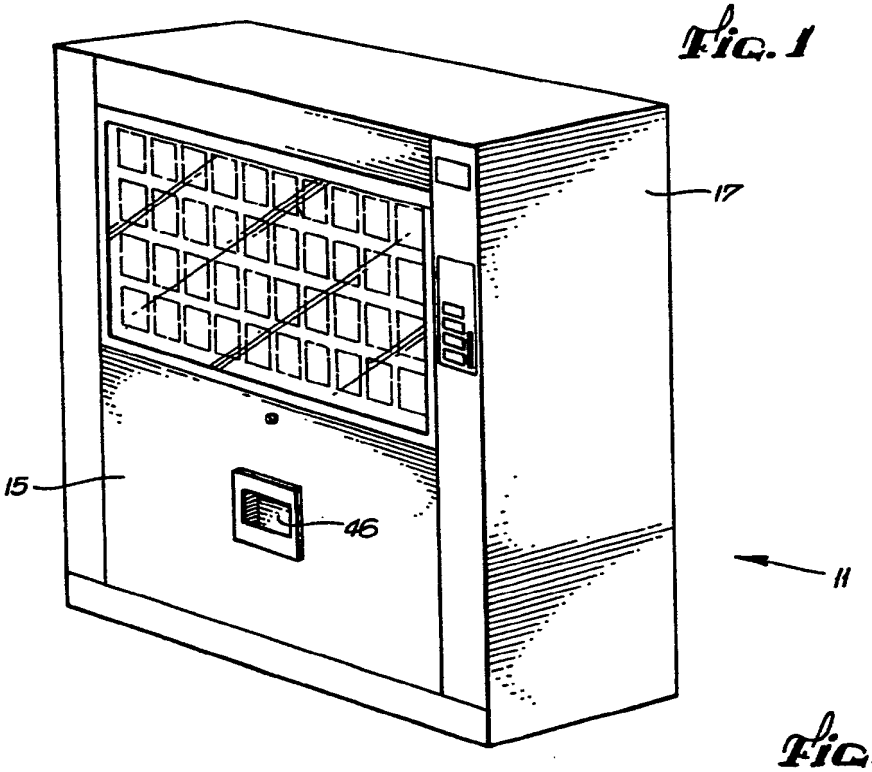

Fig. 2

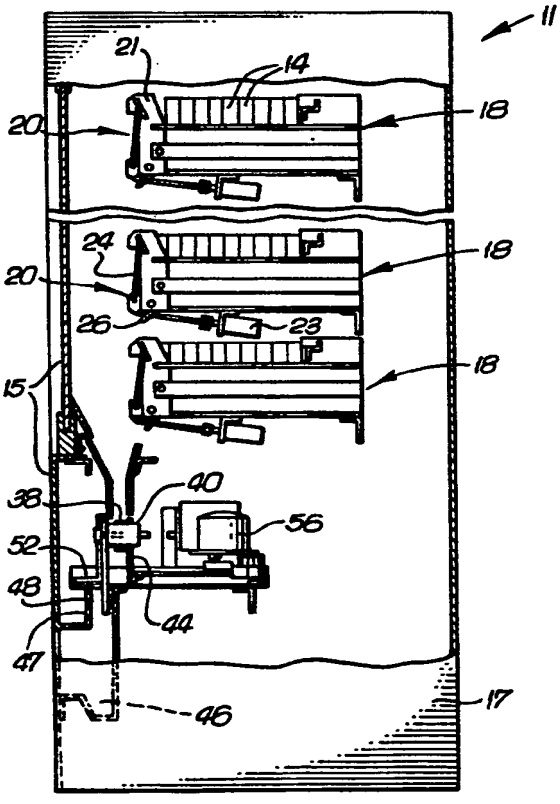

Fig. 3

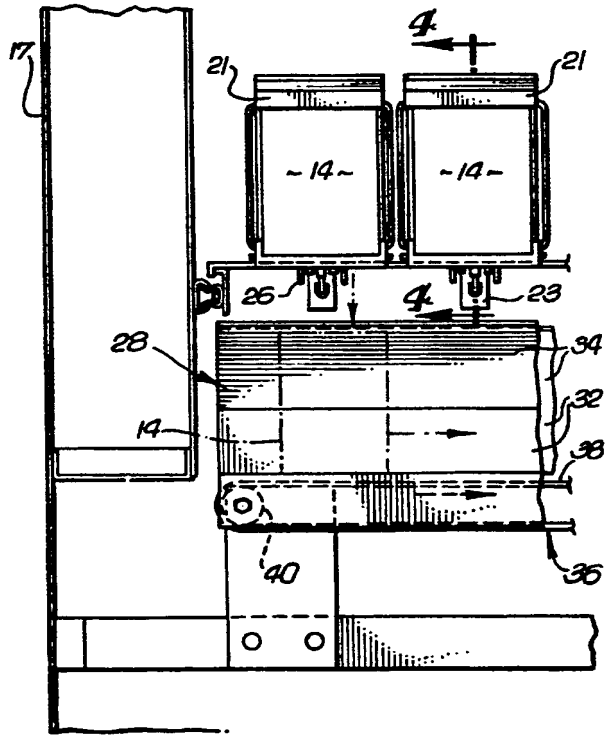

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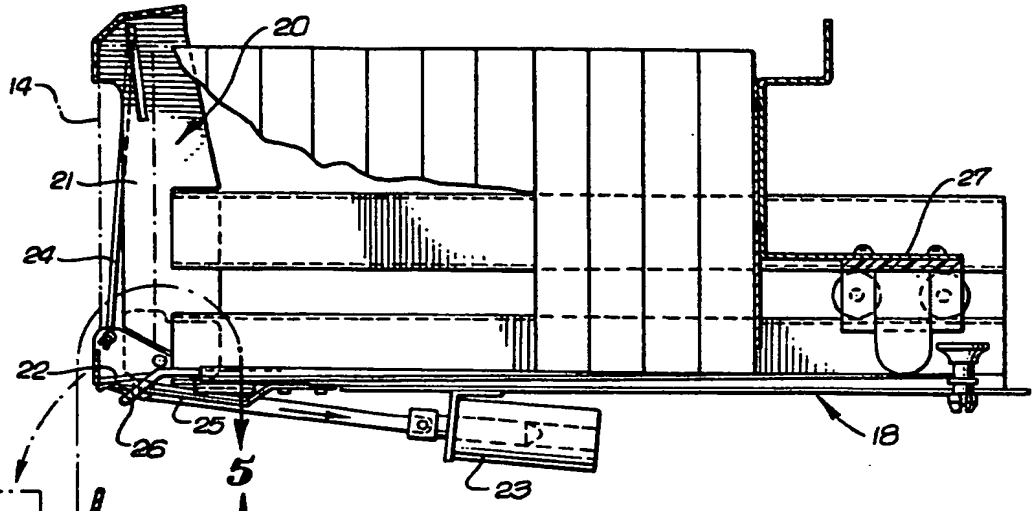
Fig. 4



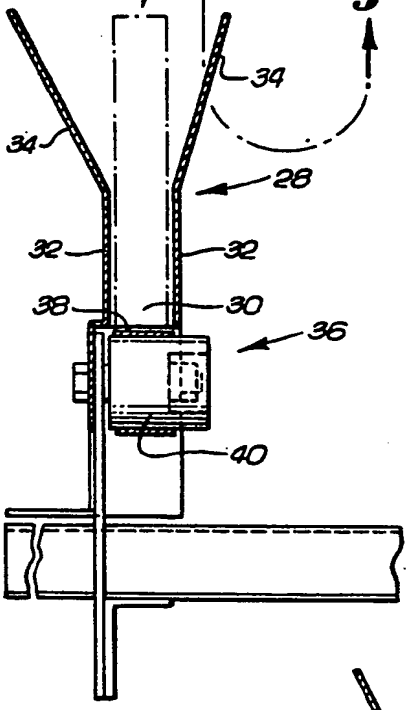
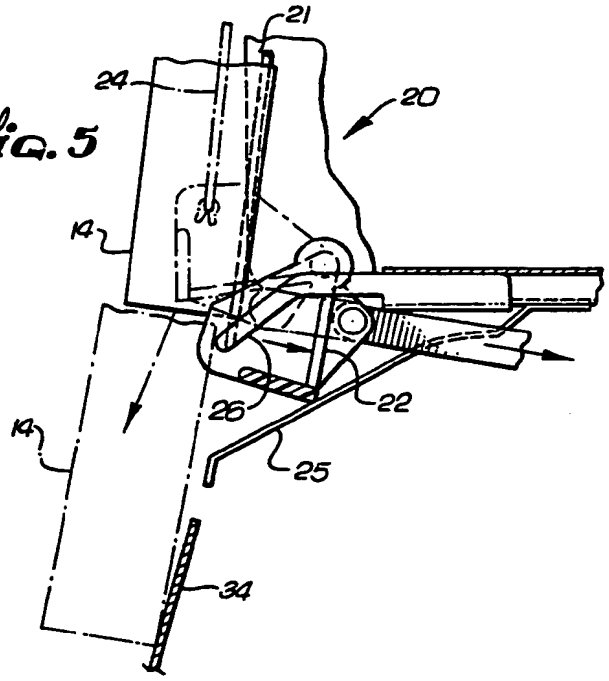


Fig. 5



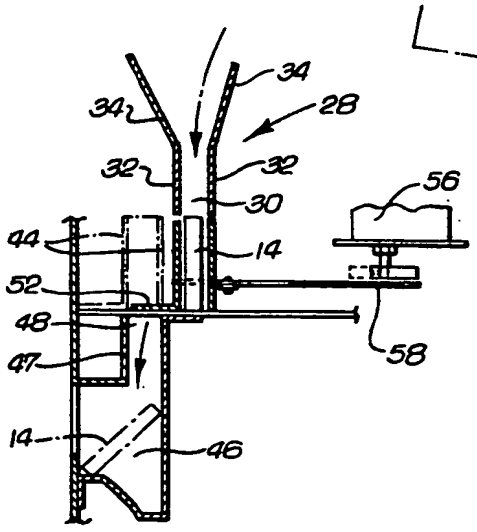


Fig. 6

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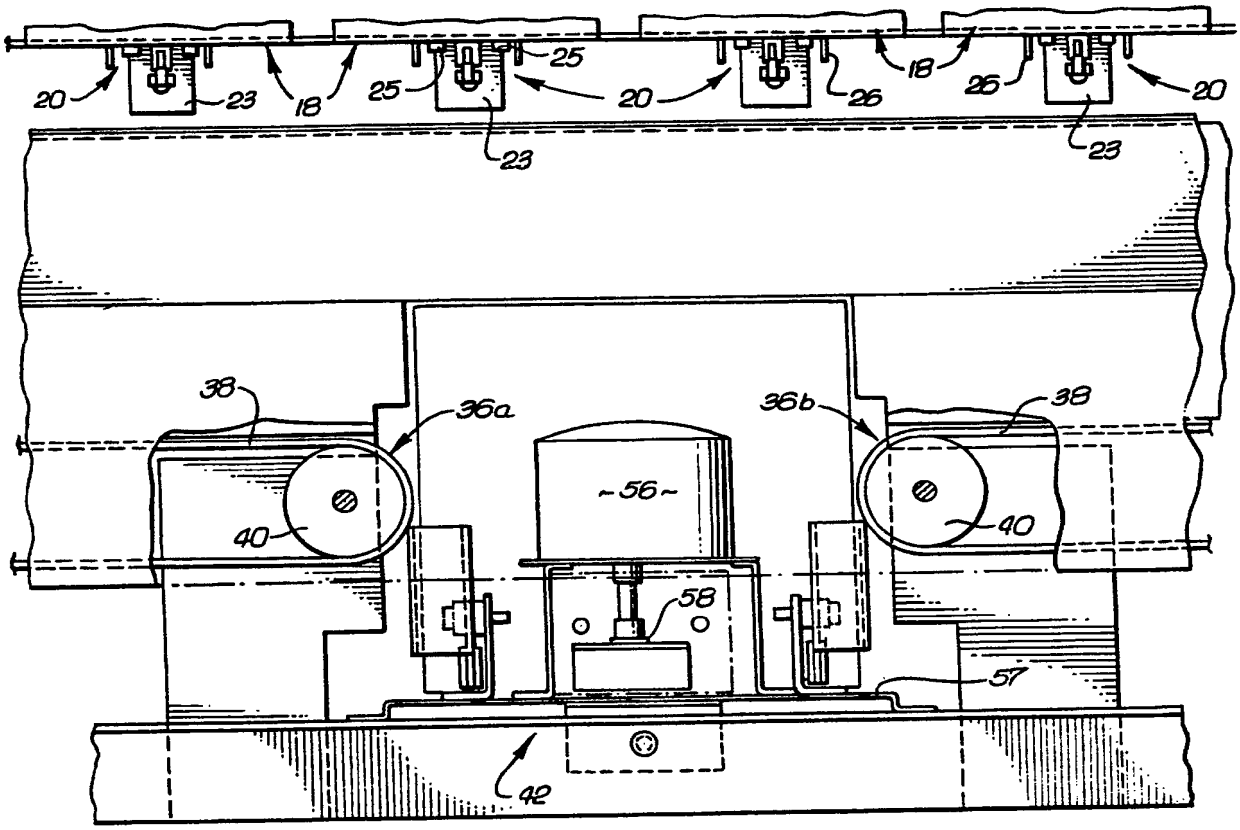

Fig. 7

Fig. 8

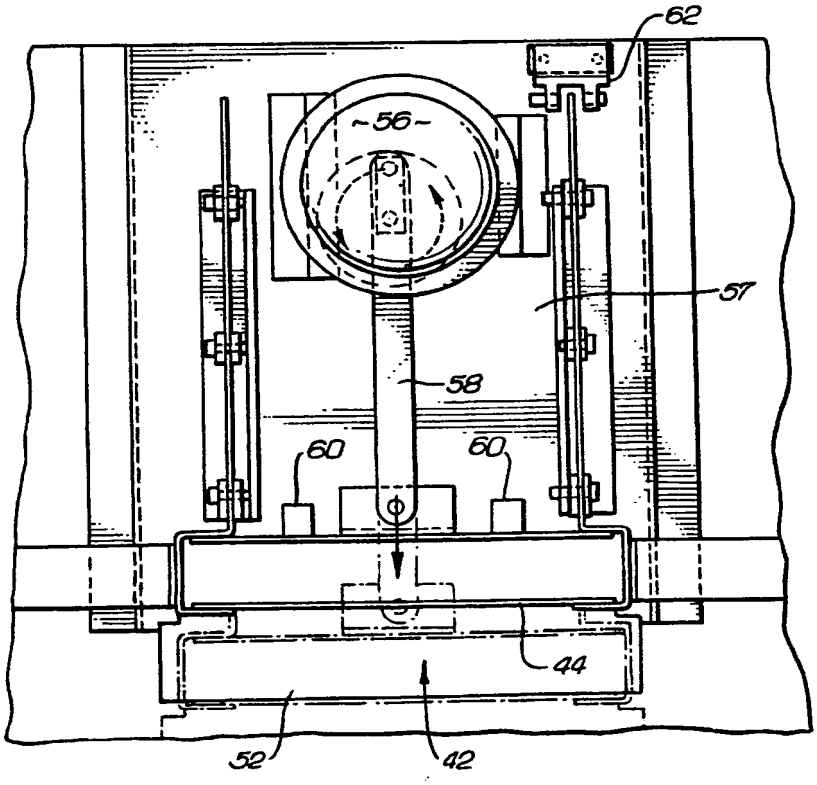

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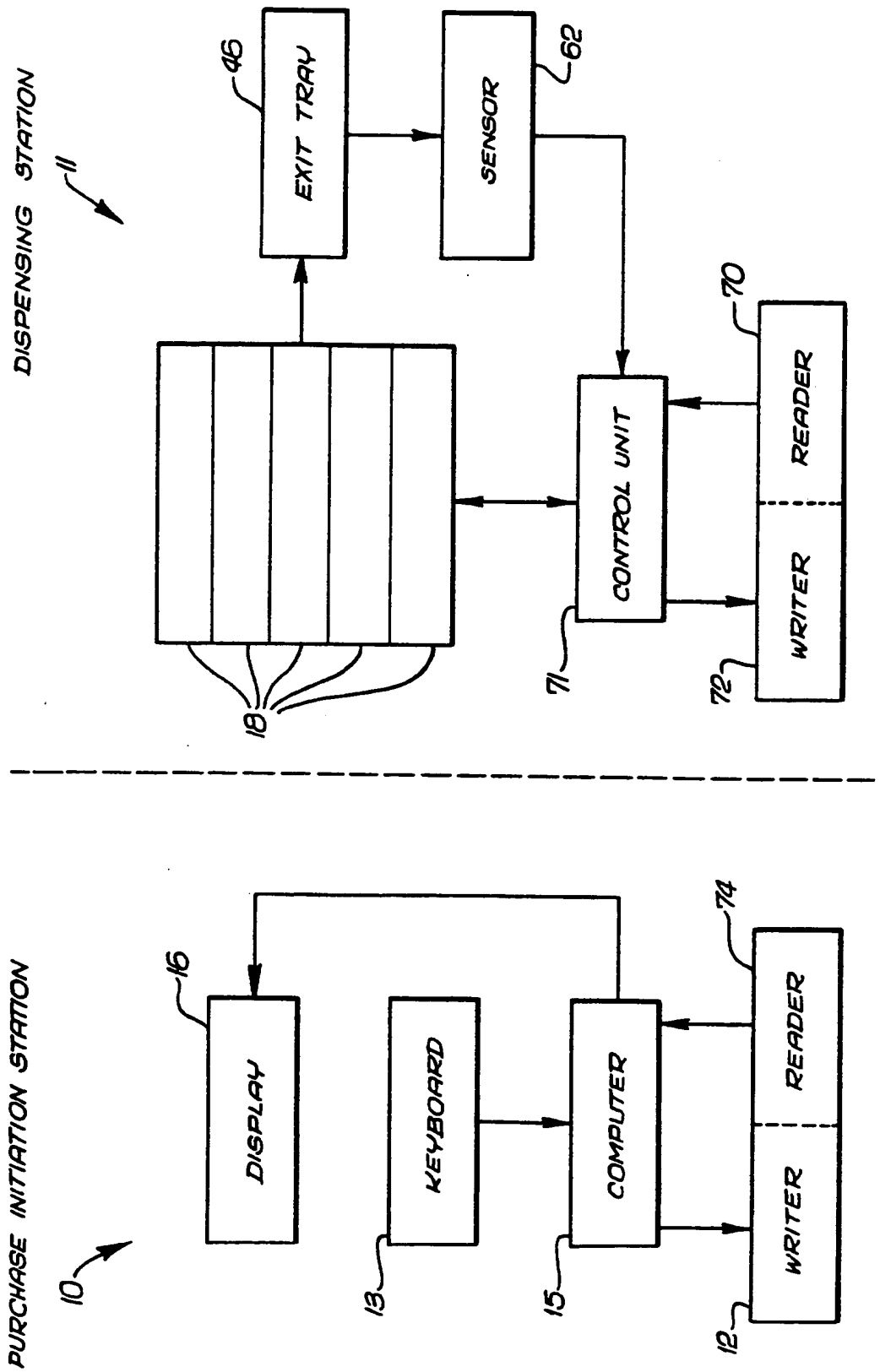
Fig. 9



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European Patent Office

EUROPEAN SEARCH REPORT

0135631 Application number

EP 83 30 5857

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Y	US-A-3 774 743 (W.W. HENDRICKSON) * Abstract; figures; column 2, lines 5-54 *	1-5	G 07 F 7/00
Y	US-A-3 653 480 (M. YAMAMOTO) * Abstract; figures; claims *	1-3,5	
A	US-A-3 824 544 (L.G. SIMJIAN) * Abstract; figures; column 1, line 40 - column 3, line 58 *	1-3,5	
A	US-A-3 901 366 (J.T. SCHULLER) * Abstract; figure 1; column 1, line 25 - column 2, line 24 *	1-5	

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

G 07 F 7/00
G 07 F 7/02
G 07 F 7/04
G 07 F 7/08
G 06 F 15/26
G 07 B 11/11

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	25-05-1984	DAVID J.Y.H.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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